

What is claimed is:

1. A method for forming a superconducting magnesium diboride (MgB_2) thin film, the method comprising:

forming a boron thin film on a monocrystalline sapphire substrate or a monocrystalline strontium titanate substrate by pulsed laser deposition, sputtering deposition, electron beam evaporation, metallorganic chemical vapor deposition, or chemical vapor deposition;

thermally processing the substrate on which the boron thin film is formed along with a magnesium source and cooling the resulting structure, the substrate having the boron thin film and the magnesium source being double sealed with a container made of tantalum or niobium on the inside and a container made of quartz on the outside;

placing the substrate with the boron thin film and the magnesium source in a heat source having a temperature equal to or greater than 600EC and less than 950EC; and

rapidly heating the substrate with the boron thin film and the magnesium source for 10-60 minutes, and then cooling the substrate,

wherein both ends of the container made of tantalum or niobium are sealed in an inert gas atmosphere, and both ends of the container made of quartz are sealed in a vacuum.